We Claim:

1. A discharge device, comprising:
a first electrode;
a second electrode on the first electrode;
a dielectric layer between the first and second electrodes; and
a cavity that extends through the first electrode and the dielectric layer,
wherein the first electrode comprises a screen.

2. The discharge device of claim 1, wherein at least one of the first electrode and second electrode comprises an optically transmissive material.

3. The discharge device of claim 1, further comprising one of a phosphor and an electroluminescent material on the screen.

4. The discharge device of claim 1, further comprising optically transmissive sealing material to seal the cavity.

5. The discharge device of claim 4, further comprising an optically transmissive protective material disposed between the sealing material and the cavity.

6. The discharge device of claim 1, further comprising a gas disposed within the cavity.

7. The discharge device of claim 1, wherein the second electrode comprises a plurality of layers, at least one of the plurality of layers being electrically conductive.

8. The discharge device of claim 7, wherein the at least one of the plurality of layers is disposed more proximate to the cavity than remaining layers of the second electrode.

9. The discharge device of claim 8, wherein the remaining layers reflect light of undesired wavelengths back into the cavity.

10. The discharge device of claim 1, wherein the dielectric layer comprises a plurality of films, at least one of the films having a dielectric constant different from at least another of the films.

11. The discharge device of claim 1, wherein the first electrode further comprises a conductive layer disposed between the dielectric layer and the screen.

12. A plurality of discharge devices according to claim 1, wherein the devices are arranged in an array.

13. The array of discharge devices of claim 12, further comprising an optically transmissive sealing material to seal the cavities.

14. The array of discharge devices of claim 13, further comprising an optically transmissive protective material disposed between the sealing material and the cavities.

15. The array of discharge devices of claim 12, wherein the dielectric layer comprises a plurality of films, at least one of the films having a dielectric constant different from at least another of the films.

16. The array of discharge devices of claim 12, wherein the devices in the array are divided into sub-arrays.

17. A plurality of discharge devices according to claim 1, wherein the devices are arranged in a stack.

18. A microlaser comprising the plurality of discharge devices according to claim 17.

19. A hazardous gas remediator comprising the plurality of discharge devices according to claim 17.

20. A lighting array comprising the plurality of discharge devices according to claim 12.

21. An array for photodynamic therapy comprising the plurality of discharge devices according to claim 12.

22. A gas chromatography array comprising the plurality of discharge devices according to claim 12.

23. The discharge device of claim 1, wherein the cavity extends entirely through both of the first and second electrodes.

24. The discharge device of claim 1, wherein the dielectric layer comprises one of a polymer, an oxide and a nitride.

25. The discharge device of claim 1, wherein a discharge in the cavity is formed when a voltage of 120 V is applied between the first electrode and the second electrode.

26. The discharge device of claim 1, wherein a thickness of the device is at most 100 μm.

27. The discharge device of claim 1, further comprising a gas having a pressure of greater than 250 Torr within the cavity.

28. The discharge device of claim 9, wherein the gas has a breakdown voltage of at least 10^4 V-cm.

29. The discharge device of claim 9, wherein both the first and second electrode are formed from an optically transmissive material and entirely cover openings of the cavity.

30. A discharge device, comprising:

a first electrode;

a second electrode on the first electrode;

a dielectric layer between the first and second electrodes; and

a cavity that extends through the dielectric layer,

wherein the dielectric layer comprises a plurality of films, at least one of the films having a dielectric constant different from at least another of the films.

31. The discharge device of claim 30, further comprising a gas disposed within the cavity.

32. The discharge device of claim 30, wherein the cavity terminates before extending entirely through either of the first and second electrodes.

33. The discharge device of claim 30, wherein the cavity extends entirely through both of the first and second electrodes.

34. The discharge device of claim 30, wherein at least one of the first and second electrodes comprises an optically transmissive material.

35. The discharge device of claim 34, wherein the optically transmissive material entirely covers an opening of the cavity.

36. The discharge device of claim 30, further comprising optically transmissive sealing material to seal the cavity.

37. The discharge device of claim 36, further comprising an optically transmissive protective material disposed between the sealing material and the cavity.

38. The discharge device of claim 30, wherein at least one of the first and second electrodes comprises a plurality of layers, at least one of the plurality of layers being electrically conductive.

39. The discharge device of claim 38, wherein the at least one of the plurality of layers is disposed more proximate to the cavity than remaining layers of the second electrode.

40. The discharge device of claim 39, wherein the remaining layers reflect light of undesired wavelengths back into the cavity.

41. The discharge device of claim 30, wherein at least one of the first and second electrodes comprises a screen and a conductive layer disposed between the dielectric layer and the screen.

42. A plurality of discharge devices according to claim 30, wherein the devices are arranged in an array.

43. The array of discharge devices of claim 42, further comprising an optically transmissive sealing material to seal the cavities.

44. The array of discharge devices of claim 42, further comprising an optically transmissive protective material disposed between the sealing material and the cavities.

45. The array of discharge devices of claim 42, wherein the devices in the array are divided into sub-arrays.

46. A plurality of discharge devices according to claim 30, wherein the devices are arranged in a stack.

47. A microlaser comprising the plurality of discharge devices according to claim 47.

48. A hazardous gas remediator comprising the plurality of discharge devices according to claim 47.

49. A lighting array comprising the plurality of discharge devices according to claim 42.

50. An array for photodynamic therapy comprising the plurality of discharge devices according to claim 42.

51. A gas chromatography array comprising the plurality of discharge devices according to claim 42.

52. A collection of discharge devices, comprising:

a plurality of discharge devices, each discharge device comprising:

a first electrode;

a second electrode on the first electrode;

a dielectric layer between the first and second electrodes; and

a cavity that extends through the first electrode and the dielectric layer,

wherein the plurality of discharge devices are electrically connected together and when a minimum voltage sufficient to cause discharge of at least 10 of the devices in the plurality of discharge devices is applied, then a voltage difference between the first and second electrode at every cavity of the at least 10 devices has a voltage difference of no more than 20% of an average voltage difference between the first and second electrodes of the at least 10 devices.

53. A collection of discharge devices according to claim 52, wherein the voltage difference is no more than 10% of the average voltage difference.

54. A collection of discharge devices according to claim 52, wherein the voltage difference is no more than 2% of the average voltage difference.

55. A collection of discharge devices according to claim 52, wherein the voltage difference is no more than 1% of the average voltage difference.

56. A collection of discharge devices according to claim 52, wherein the minimum voltage is sufficient to cause discharge of at least 100 of the devices in the plurality of discharge devices.

57. A collection of discharge devices according to claim 52, wherein the minimum voltage is sufficient to cause discharge of at least 1000 of the devices in the plurality of discharge devices.

58. The collection of discharge devices of claim 52, wherein the cavities extend entirely through at least one of the first and second electrodes.

59. The collection of discharge devices of claim 52, wherein the cavities extend entirely through both of the first and second electrodes.

60. The collection of discharge devices of claim 52, wherein the cavities terminate before extending entirely through either of the first and second electrodes.

61. The collection of discharge devices of claim 52, further comprising a gas disposed within the cavity.

62. The collection of discharge devices of claim 52, wherein at least one of the first and second electrodes comprises an optically transmissive material.

63. The collection of discharge devices of claim 52, wherein both the first and second electrodes are formed from an optically transmissive material.

64. The collection of discharge devices of claim 52, wherein each of the dielectric layers comprise a plurality of films, at least one of the films having a dielectric constant different from at least another of the films.

65. The collection of discharge devices of claim 52, wherein at least one of the first and second electrodes comprises a plurality of layers, at least one of the plurality of layers being electrically conductive.

66. The collection of discharge devices of claim 65, wherein the at least one of the plurality of layers is disposed more proximate to the cavity than remaining layers of the second electrode.

67. The collection of discharge devices of claim 66, wherein the remaining layers reflect light of undesired wavelengths back into the cavity.

68. The collection of discharge devices of claim 52, wherein at least one of the first and second electrodes comprises a screen.

69. The collection of discharge devices of claim 68, wherein a conductive layer is disposed between the dielectric layer and the screen.

70. The collection of discharge devices of claim 52, further comprising an optically transmissive sealing material to seal the cavities.

71. The collection of discharge devices of claim 70, further comprising an optically transmissive protective material disposed between the sealing material and the cavities.

72. A collection of discharge devices according to claim 52, wherein the devices are arranged in an array.

73. The collection of discharge devices of claim 72, wherein the devices in the array are divided into sub-arrays.

74. The collection of discharge devices of claim 73, wherein the sub-arrays have at most one of the two electrodes in common.

75. The collection of discharge devices of claim 73, wherein the sub-arrays are excited in parallel.

76. A lighting array comprising the discharge devices according to claim 72.

77. An array for photodynamic therapy comprising the discharge devices according to claim 72.

78. A gas chromatography array comprising the discharge devices according to claim 72.

79. A method of fabricating a discharge device, the method comprising:

positioning a multi-layer dielectric layer on a first electrode;

positioning a second electrode on the dielectric layer; and

providing a cavity through at least a portion of the dielectric layer.

80. A method of claim 79, further comprising providing the cavity by one of mechanical drilling, ultrasonical drilling, optical drilling, dry etching, and wet chemical etching.

81. The method of claim 79, further comprising providing the cavity in at least one of the first and second electrodes.

82. The method of claim 79, further comprising providing the cavity prior to assembling the dielectric layer and the first and second electrodes.

83. The method of claim 79, further comprising filling the cavity with a gas.

84. The method of claim 83, further comprising affixing optically transmissive sealing material on at least one end of the gas-filled cavity and sealing the gas-filled cavity with the sealing material.

85. The method of claim 84, further comprising coating the sealing material with an optically transmissive protective material prior to sealing the gas-filled cavity.

86. The method of claim 79, further comprising forming at least one of the first and second electrodes from a plurality of layers of which at least one is electrically conductive, positioning the at least one layer of one of the first and second electrodes more proximate to the cavity than remaining layers of the one of the first and second electrodes, and reflecting light of undesired wavelengths back into the cavity via the remaining layers.

87. The method of claim 79, further comprising forming at least one of the first and second electrodes from a conducting screen.

88. The method of claim 79, further comprising arranging a plurality of discharge devices having a plurality of cavities in an array.

89. An method of claim 88, further comprising covering the cavity with a conducting screen disposed on at least one of the first and second electrodes.

90. The method of claim 88, further comprising sealing the cavities with an optically transmissive sealing material.

91. The method of claim 90, further comprising coating the sealing material with an optically transmissive protective material prior to sealing the cavities.

92. The method of claim 88, further comprising dividing the array into sub-arrays, applying a minimum voltage sufficient to cause discharge of at least 10 of the devices in the array, and determining that a voltage difference between the first and second electrode at every cavity of the at least 10 of the devices has a voltage difference of no more than 50% of an average voltage difference between the first and second electrodes of the at least 10 of the devices.